Freescale Semiconductor
Technical Data

MRF18085A
Rev. 4, 12/2004

RF Power Field Effect Transistors

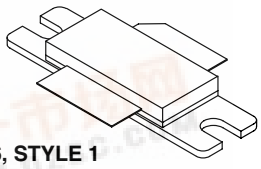
N-Channel Enhancement-Mode Lateral MOSFETs

Designed for GSM and GSM EDGE base station applications with frequencies from 1800 to 2000 MHz. Suitable for TDMA, CDMA and multicarrier amplifier applications. To be used in Class AB for PCN-PCS/ cellular radio and WLL applications. Specified for GSM-GSM EDGE 1805-1880 MHz.

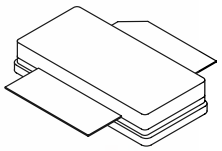
- GSM and GSM EDGE Performance, Full Frequency Band (1805-1880 MHz)
  Power Gain - 15 dB (Typ) @ 85 Watts CW
  Efficiency - 52% (Typ) @ 85 Watts CW
- Internally Matched, Controlled Q, for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Designed for Maximum Gain and Insertion Phase Flatness
- Capable of Handling 5:1 VSWR, @ 26 Vdc, @ P1dB Output Power, @ f = 1805 MHz
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Available with Low Gold Plating Thickness on Leads. L Suffix Indicates 40μ″ Nominal.
- In Tape and Reel. R3 Suffix = 250 Units per 56 mm, 13 inch Reel.

MRF18085AR3
MRF18085ALSR3

1800-1880 MHz, 85 W, 26 V
GSM/GSM EDGE
LATERAL N-CHANNEL
RF POWER MOSFETs



CASE 465-06, STYLE 1
NI-780
MRF18085AR3



CASE 465A-06, STYLE 1
NI-780S
MRF18085ALSR3

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-0.5, +65	Vdc
Gate-Source Voltage	V_{GS}	-0.5, +15	Vdc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	273 1.56	W W/°C
Storage Temperature Range	T_{stg}	- 65 to +150	°C
Operating Junction Temperature	T_J	200	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value (1)	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.79	°C/W

Table 3. ESD Protection Characteristics

Test Conditions	Class
Human Body Model	1 (Minimum)
Machine Model	M3 (Minimum)

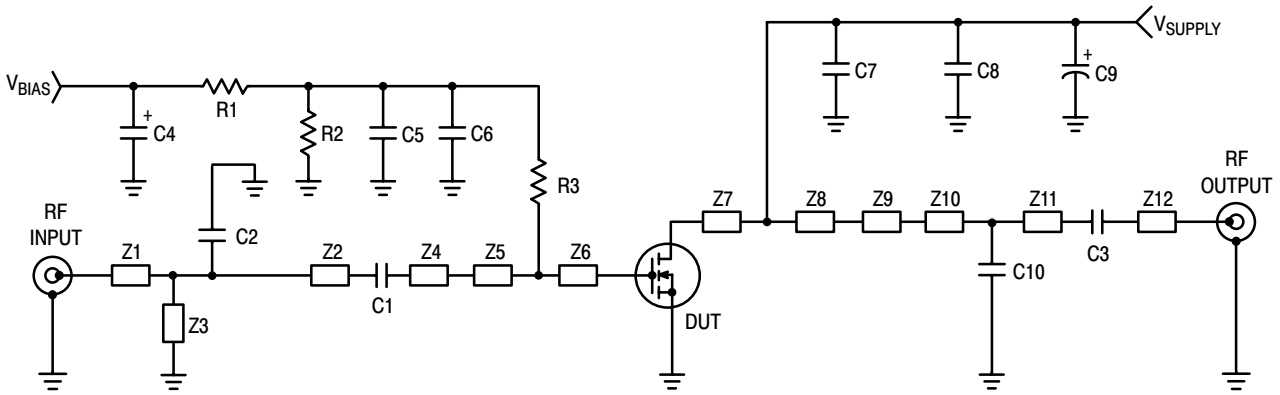
1. Refer to AN1955/D, *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.freescale.com/rf. Select Documentation/Application Notes - AN1955.

NOTE - **CAUTION** - MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

Table 4. Electrical Characteristics (T_C = 25°C unless otherwise noted)

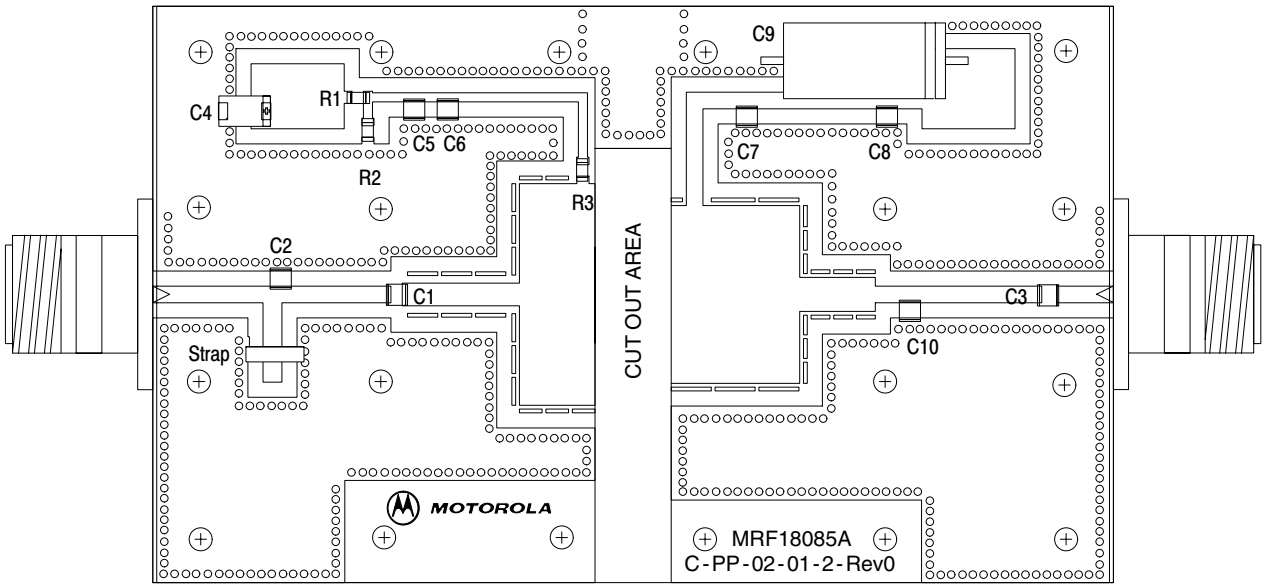
Characteristic	Symbol	Min	Typ	Max	Unit
Off Characteristics					
Drain-Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 100 μAdc)	$V_{(BR)DSS}$	65	—	—	Vdc
Zero Gate Voltage Drain Current (V_{DS} = 26 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
Gate-Source Leakage Current (V_{GS} = 5 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	1	μAdc
On Characteristics					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 200 μAdc)	$V_{GS(th)}$	2	—	4	Vdc
Gate Quiescent Voltage (V_{DS} = 26 Vdc, I_D = 600 mAdc)	$V_{GS(Q)}$	2.5	3.9	4.5	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 2 Adc)	$V_{DS(on)}$	—	0.15	—	Vdc
Forward Transconductance (V_{DS} = 10 Vdc, I_D = 2 Adc)	g_{fs}	—	6.0	—	S
Dynamic Characteristics					
Reverse Transfer Capacitance (1) (V_{DS} = 26 Vdc, V_{GS} = 0, f = 1 MHz)	C_{rss}	—	3.6	—	pF
Functional Tests (In Freescale Test Fixture, 50 ohm system)					
Common-Source Amplifier Power Gain @ 85 W (2) (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1805 - 1880 MHz)	G_{ps}	13.5	15	—	dB
Drain Efficiency @ 85 W (2) (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1805 - 1880 MHz)	η	48	52	—	%
Input Return Loss @ 85 W (2) (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1805 - 1880 MHz)	IRL	—	-12	-9	dB
Power Output, 1 dB Compression Point (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1805 - 1880 MHz)	P1dB	83	90	—	Watts
Output Mismatch Stress @ P1dB (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1805 MHz, VSWR = 5:1, All Phase Angles at Frequency of Tests)	Ψ	No Degradation In Output Power Before and After Test			

1. Part is internally matched both on input and output.
2. To meet application requirements, Freescale test fixtures have been designed to cover the full GSM1800 band, ensuring batch-to-batch consistency.



C1, C3, C6, C7	10 pF Chip Capacitors, ATC
C2	1.8 pF Chip Capacitor, ATC
C4	10 μF, 35 V Tantalum Capacitor, AVX
C5, C8	1 nF Chip Capacitors, ATC
C9	220 μF, 63 V Electrolytic Capacitor, Radial, Philips
C10	0.3 pF Chip Capacitor, ATC
R1, R2	10 kΩ, 1/4 W Chip Resistors (1206)
R3	1.0 kΩ, 1/4 W Chip Resistor (1206)
Z1	0.671″ x 0.087″ Microstrip
Z2	0.568″ x 0.087″ Microstrip
Z3	0.500″ x 0.098″ Microstrip Shorted Stub
Z4	0.610″ x 00.118″ Microstrip
Z5	0.331″ x 1.153″ Microstrip
Z6	0.063″ x 1.153″ Microstrip
Z7	0.122″ x 0.925″ Microstrip
Z8	0.547″ x 0.925″ Microstrip
Z9	0.394″ x 0.177″ Microstrip
Z10	0.180″ x 0.087″ Microstrip
Z11	0.686″ x 0.087″ Microstrip
Z12	0.294″ x 0.087″ Microstrip
PCB	Taconic TLX8, 30 mils, ε_r = 2.55

Figure 1. 1800-1880 MHz Test Fixture Schematic



Freescale has begun the transition of marking Printed Circuit Boards (PCBs) with the Freescale Semiconductor signature/logo. PCBs may have either Motorola or Freescale markings during the transition period. These changes will have no impact on form, fit or function of the current product.

Figure 2. 1800-1880 MHz Test Fixture Component Layout

TYPICAL CHARACTERISTICS

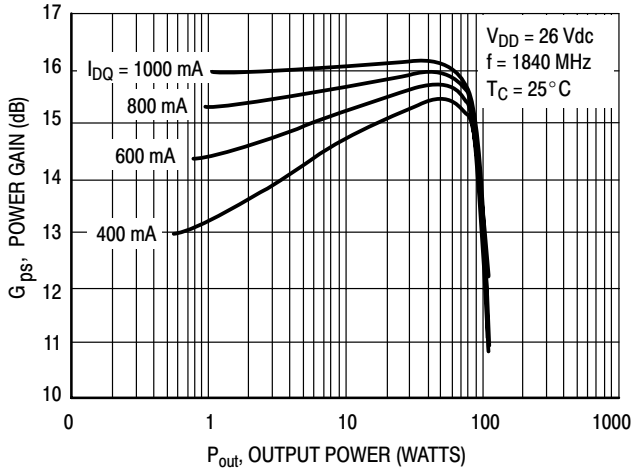


Figure 3. Power Gain versus Output Power

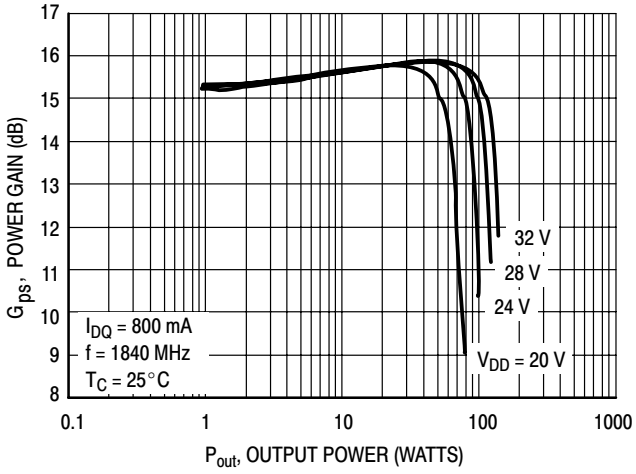


Figure 4. Power Gain versus Output Power

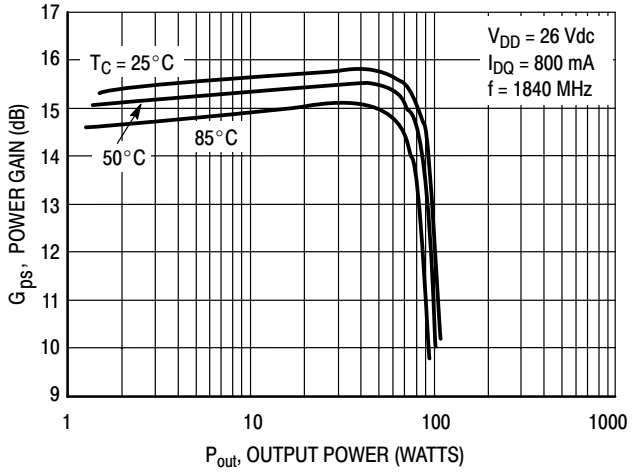


Figure 5. Power Gain versus Output Power

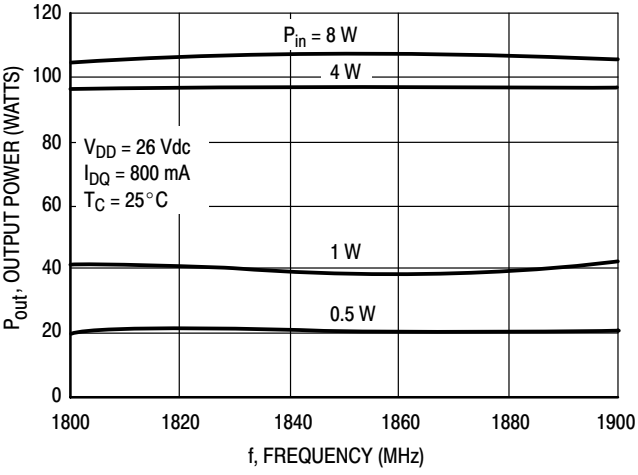


Figure 6. Output Power versus Frequency

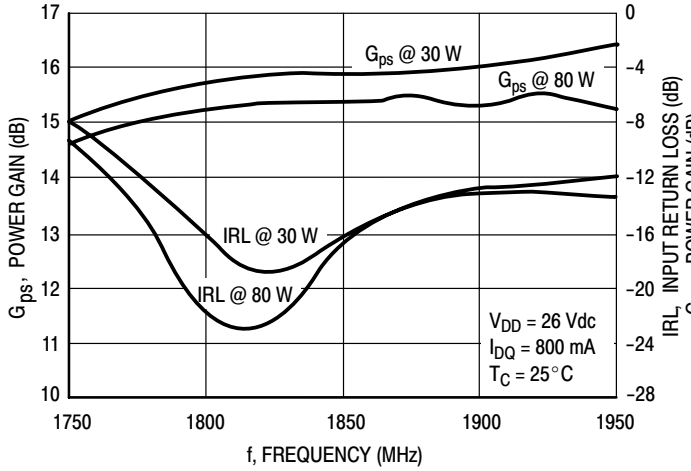


Figure 7. Power Gain versus Frequency

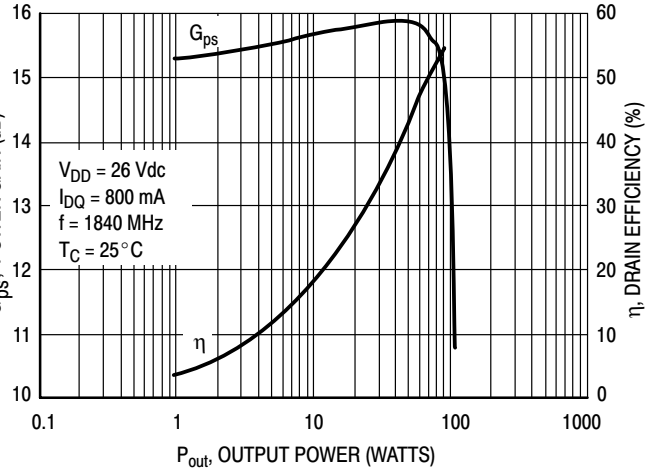
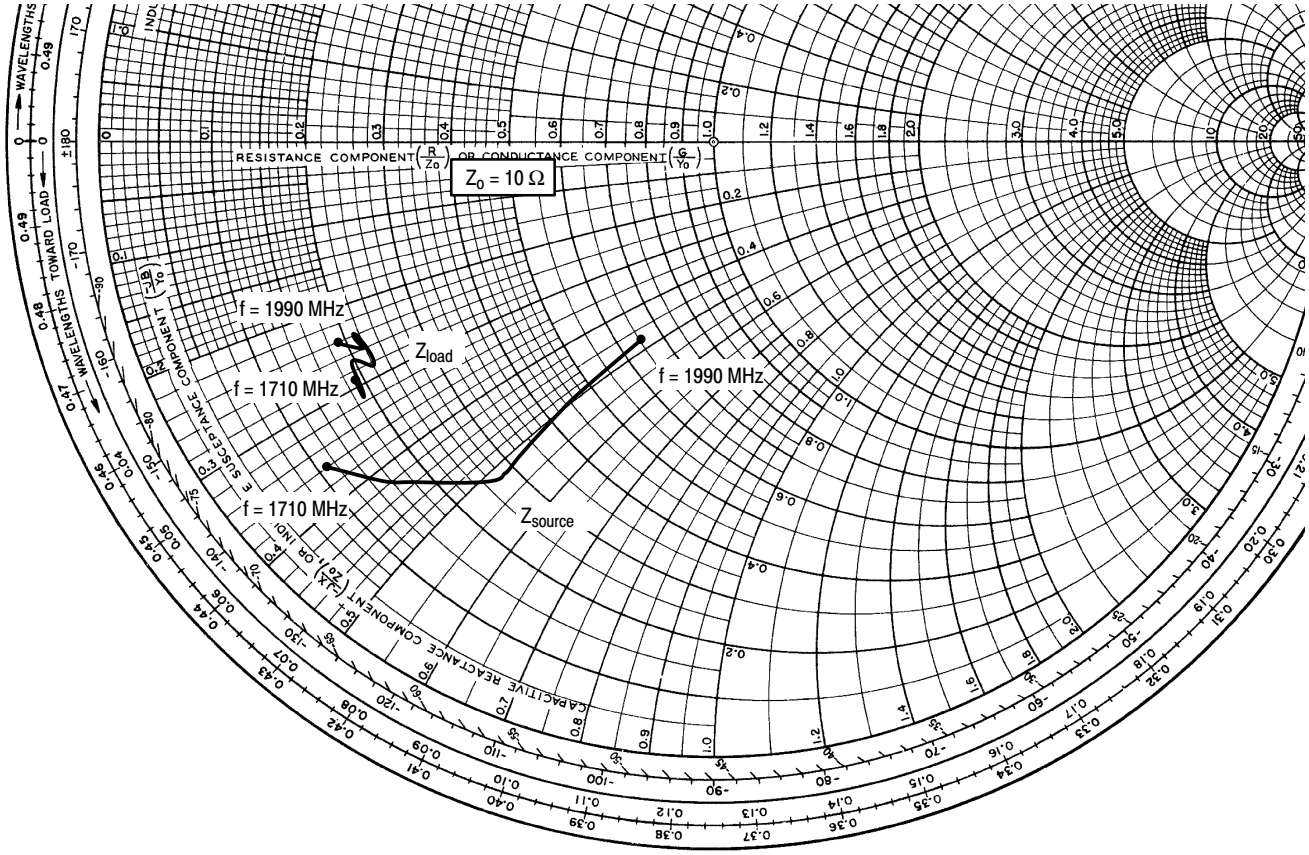


Figure 8. Power Gain and Efficiency versus Output Power



V_{DD} = 26 V, I_{DQ} = 800 mA, P_{out} = 85 W CW

f MHz	Z_{source} Ω	Z_{load} Ω
1710	1.13 - j3.62	1.79 - j2.88
1785	1.61 - j4.23	1.82 - j3.15
1805	1.69 - j4.34	1.90 - j2.66
1880	2.83 - j5.25	2.09 - j2.77
1930	3.00 - j5.18	2.01 - j2.44
1960	4.39 - j4.97	2.01 - j2.57
1990	6.59 - j4.74	1.79 - j2.37

Z_{source} = Test circuit impedance as measured from gate to ground.

Z_{load} = Test circuit impedance as measured from drain to ground.

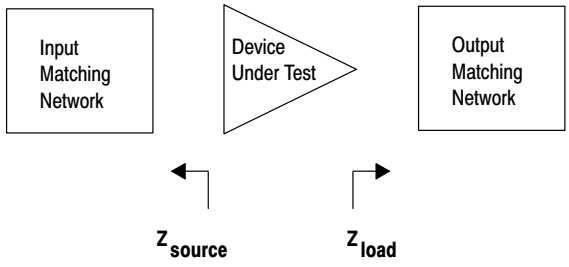
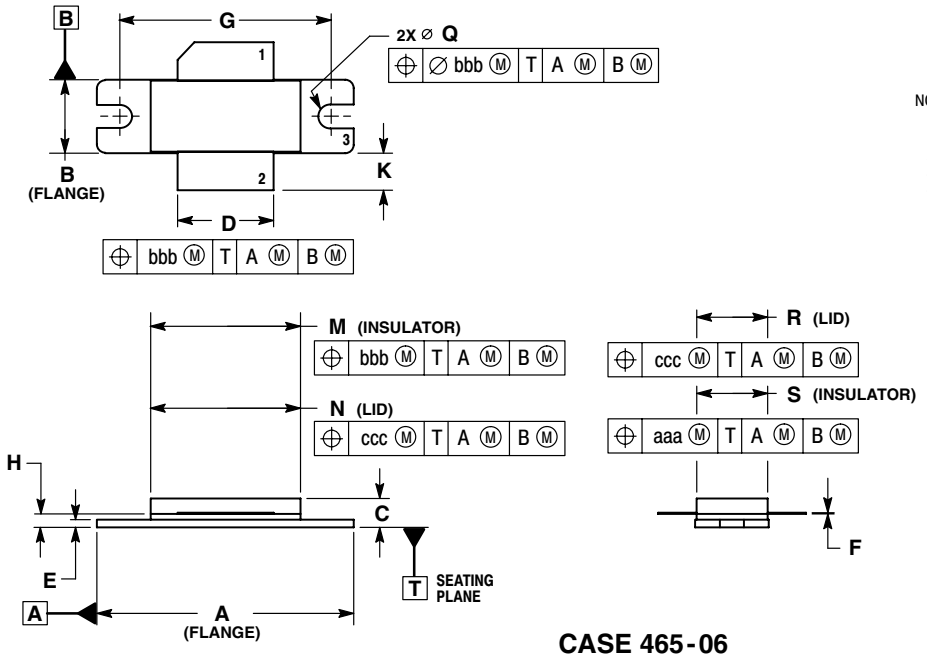


Figure 9. Series Equivalent Source and Load Impedance

NOTES

PACKAGE DIMENSIONS

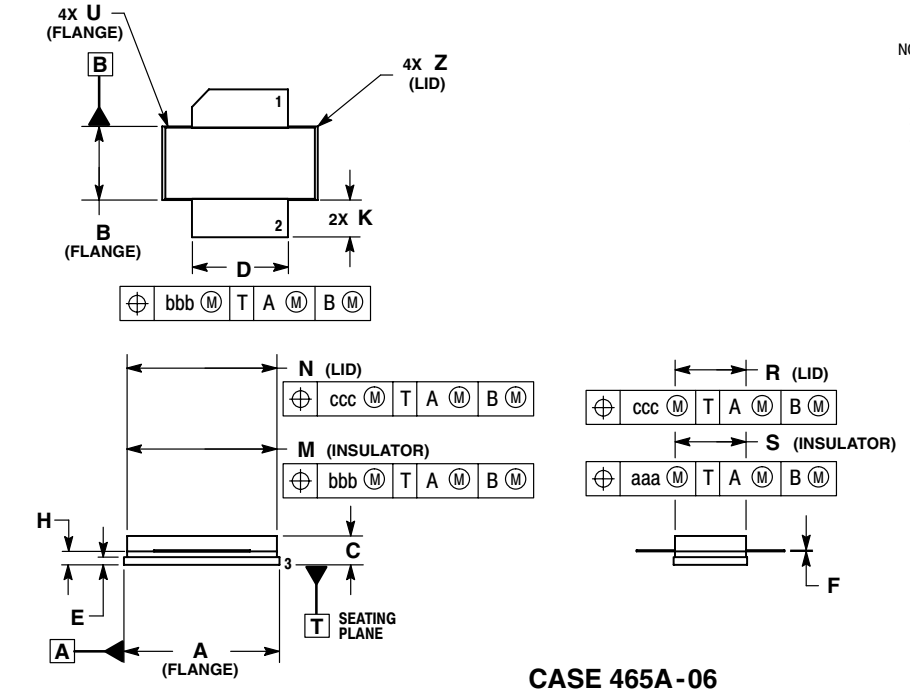


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M–1994.
2. CONTROLLING DIMENSION: INCH.
3. DELETED
4. DIMENSION H IS MEASURED 0.030 (0.762) AWAY FROM PACKAGE BODY.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	1.335	1.345	33.91	34.16
B	0.380	0.390	9.65	9.91
C	0.125	0.170	3.18	4.32
D	0.495	0.505	12.57	12.83
E	0.035	0.045	0.89	1.14
F	0.003	0.006	0.08	0.15
G	1.100 BSC		27.94 BSC	
H	0.057	0.067	1.45	1.70
K	0.170	0.210	4.32	5.33
M	0.774	0.786	19.66	19.96
N	0.772	0.788	19.60	20.00
Q	Ø.118	Ø.138	Ø3.00	Ø3.51
R	0.365	0.375	9.27	9.53
S	0.365	0.375	9.27	9.52
aaa	0.005 REF		0.127 REF	
bbb	0.010 REF		0.254 REF	
ccc	0.015 REF		0.381 REF	

STYLE 1:
PIN 1. DRAIN
2. GATE
3. SOURCE

CASE 465-06
ISSUE F
NI-780
MRF18085AR3



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	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.805	0.815	20.45	20.70
B	0.380	0.390	9.65	9.91
C	0.125	0.170	3.18	4.32
D	0.495	0.505	12.57	12.83
E	0.035	0.045	0.89	1.14
F	0.003	0.006	0.08	0.15
H	0.057	0.067	1.45	1.70
K	0.170	0.210	4.32	5.33
M	0.774	0.786	19.61	20.02
N	0.772	0.788	19.61	20.02
R	0.365	0.375	9.27	9.53
S	0.365	0.375	9.27	9.52
U	---	0.040	---	1.02
Z	---	0.030	---	0.76
aaa	0.005 REF		0.127 REF	
bbb	0.010 REF		0.254 REF	
ccc	0.015 REF		0.381 REF	

STYLE 1:
PIN 1. DRAIN
2. GATE
5. SOURCE

CASE 465A-06
ISSUE F
NI-780S
MRF18085ALSR3

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